FUNCTION BINDING AND SELECTION IN A NETWORK

FIELD OF THE INVENTION

[0001] The present invention relates to an apparatus, a method, a system, and a computer program product related to communication networks. More particularly, the present invention relates to an apparatus, a method, a system, and a computer program product related to function binding.

BACKGROUND OF THE INVENTION

Abbreviations

[0002] 3GPP 3rd generation partnership project
[0003] APN Access point name
[0004] ARP Allocation and retention priority
[0005] ATM Asynchronous Transfer Mode
[0006] CDMA Code Division Multiple Access
[0007] CSCF Call Server Control Function
[0008] DPI Deep packet inspection
[0009] DRA Diameter routing agent
[0010] EDGE Enhanced Datarate for GSM Evolution
[0011] EPC Extended packet core
[0012] ETSI European Telecommunications Standards Institute
[0013] GGSN Gateway GPRS Support Node
[0014] GPRS Global Packet Radio Service
[0015] GS Group Specification
[0016] GW Gateway
[0017] HSS Home subscriber server
[0018] HW Hardware
[0019] I-CSCF Interrogating CSCF
[0020] IETF Internet engineering task force
[0021] IMS IP multimedia subsystem
[0022] IP Internet protocol
[0023] IP-CAN IP connectivity access network
[0024] ISG Industry specification group
[0025] LAN Local Area Network
[0026] LTE Long Term Evolution
[0027] LTE-A LTE Advanced
[0028] MANO Management and orchestration
[0029] MME Mobility management entity
[0030] NAT Network address translator
[0031] NFV Network function virtualization
[0032] NFVO Network function virtualization orchestrator
[0033] OCS Online charging system
[0034] OFCS Offline charging system
[0035] O&M Operations and maintenance
[0036] PCEF Policy and charging enforcement function
[0037] PCRF Policy and charging rules function
[0038] P-CSCF Proxy call server control function
[0039] PDN Packet data network
[0040] PLMN Public Land Mobile Network
[0041] PM Physical machine
[0042] P-GW Packet data network gateway
[0043] QCI QoS class identifier
[0044] QoS Quality of Service
[0045] S-CSCF Serving call server control function
[0046] S-GW Serving gateway
[0047] SA System Architecture
[0048] SW Software
[0049] TDFTraffic Detection Function
[0050] TS Technical Specification
[0051] UE User equipment
[0052] UTRAN Universal Terrestrial Radio Access Network
[0053] VM Virtual machine
[0054] VNF Virtualized network function
[0055] WAN Wide Area Network
[0056] WiFi Wireless Fidelity

[0057] A 3GPP mobile network contains a number of network entities that are selected from amongst a number of similar entities by other kinds of entities that need to establish communication with the first kind of entities to enable user sessions. In many cases at least one of the selection criteria is network topology. The addresses or identities of the candidate entities are typically configured in the entity that shall select one entity from the candidate entities.

[0058] An example is MME which is selected by a radio network entity, e.g. eNodeB. Further packet core network examples of entities selected by another entity are S-GW and SGSN (Refer to 3GPP TS 23.401/subclause 4.3.8). Examples of 3GPP network entities selected in such a way in IMS environment are P-CSCF which is selected by P-GW based on preconfigured P-CSCF addresses (refer to 3GPP TS 29.061/subclause 13a.2.1), S-CSCF which is selected by I-CSCF (refer to 3GPP TS 23.228/subclause 5.1.2.1). Further examples of entities selected from amongst a number of similar entities are PCRF and I-CSCF. The selection/discovery of PCRF even requires an extra functionality, DRA (Diameter routing agent), in the network in order to ensure that all control entities related to a given user session are able to contact the same PCRF.

[0059] The selection of a PCRF out of plural PCRF is illustrated in FIG. 1, taken from 3GPP TS 23.203. Different types of NEs (shown on the left side) may select a PCRF through their respective interface. In order to contact the PCRF assigned to the specific user, they have to contact first a DRA which is unique in its realm and which provides information which PCRF is to be contacted. As shown in FIG. 1, there may be several diameter realms in a network (PLMN).

[0060] ETSI ISG NFV is studying network function virtualization (NFV) concerning mobile network environment and has already produced a first set/release of Group Specifications (GS). The GSs deal e.g. with the NFV infrastructure architecture and NFV management and orchestration (NFVO). The NFVO can dynamically and automatically distribute and maintain virtualized network functions in the infrastructure, i.e. set up virtual machines (VMs) to run on given physical machines (PMs) and set up virtual network functions/entities to run on the VMs, and define, allocate and scale resources to the virtual entities and machines. The NVFO may also have an interface to legacy O&M functions to utilize existing O&M functionalities.

[0061] 3GPP has also recently started working on applying network function virtualization to the 3GPP mobile network environment (refer to recent 3GPP TSG-SA1 meeting documents and reports). In a virtualized network the 3GPP mobile network entities and functionalities operate as virtual network function (VNF) instances on virtual machines on servers or server farms.

[0062] Relevant prior art is also disclosed in
[0063] 3GPP TS 23.401 (especially subclause 4.3.8).
[0064] 3GPP TS 29.061 (especially subclause 13a.2.1).